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ADVANTAGES OF MIXTURE SEEDINGS

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INTRODUCTION

Quality native ranges are composed of a variety of shrubs, grasses and forbs. Such ranges support a sufficient diversity of plants to meet most needs for livestock forage production, watershed cover, and wildlife food and cover (Sampson 1952; Hormay 1970; Dasmann 1971; Yoakum 1972). Less productive ranges usually consist of one or two dominant plant species, i.e., big sagebrush, pinyon-juniper, etc. (Fig. 1) Such monotypic types provide poor range habitat conditions because a variety of plant species is not produced to meet needs of a diversity of uses.

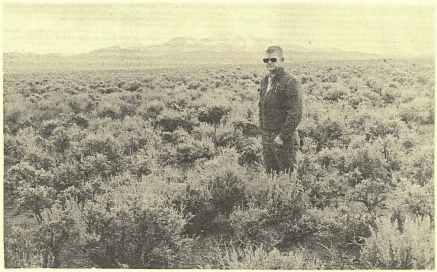

Figure 1 - Less productive native ranges often consist of monotypic vegetative types such as big sagebrush.

Throughout the western United States, range restoration work has resulted in large acreages of monotypic stands of big sagebrush and pinyon-juniper being replaced in most cases by pure stands of exotic grasses, the most common of which is crested wheatgrass (Fig. 2).

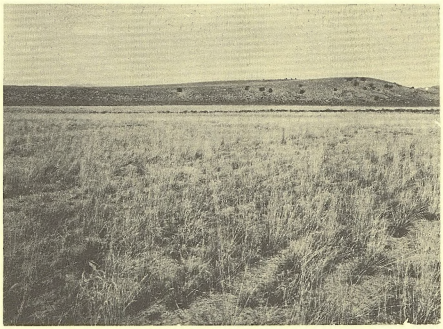

Figure 2 - Monotypic stands of exotic grasses do not always produce the best results for multiple-use management.

While such range conversions have been important in increasing the production of livestock forage, they have not, in many situations, produced the best results for multiple-use management. They have been especially detrimental to key wildlife habitats (Girard 1937; Martin 1967; Patterson 1952; and Peterson 1971).

Properly designed and executed vegetative type conversions are highly successful in providing multiple-use benefits, including increased livestock forage, improved watershed conditions and improved wildlife food and cover (Plummer, Christensen and Monsen 1968; Cain 1971; Vallentine 1971; Yoakum 1971; and Yoakum and Dasmann 1969). A major consideration is the replacement of monotypic native ranges with mixtures of plant species which will meet multiple-use requirements (Fig. 3).

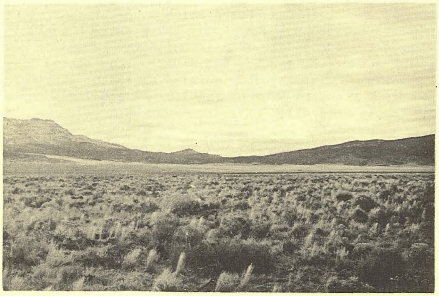

Figure 3 - Mixture seedings, consisting of shrubs, grasses and forbs, offer an excellent means of restoring rangelands for multiple-use management.

GENERAL

Range restoration work involving vegetative type conversions is often an expensive practice. Planting seed mixtures usually increases this cost. To insure maximum economic and ecological benefits of vegetative type conversions, considerable pre-planning should precede the conversion (Plummer, Christensen and Monsen 1968 and Cain 1971). As a part of the pre-planning effort, it is important to consider the: (1) need for a seed mixture; (2) type of seed mixture which will best fulfill objectives of the vegetative type conversion; and (3) suitability of components in the seed mixture to particular edaphic and climatic conditions.

ADVANTAGES OF MIXTURE SEEDINGS

Ten advantages of mixtures are:

1. Mixtures provide a variety of nourishment desirable to wildlife and livestock (Stoddart and Smith 1955; Plummer, Christensen and Monsen 1968; and Dasmann 1971). Shrubs are essential on winter game ranges to sustain the animals while the ground is covered by snow. In such areas, shrubs that retain green leaves (big sagebrush, black sagebrush, bitterbrush, fourwing saltbush, curlleaf mahogany, true mountain mahogany, rubber rabbitbrush and Stansbury cliffrose) are especially desirable.

Forbs and grasses also are needed to meet nutritional requirements of grazing and browsing animals. Both annual and perennial grasses, when green, are high in water and mineral content, and low in crude fiber. During active growth, grasses have the characteristics of a concentrated food rich in protein (Guilbert and Hart 1946). A study of the Doyle mule deer herd in Nevada and California indicate that grasses account for the difference between good and poor winter survival (Lassen, Ferrel and Leach 1952).

Legumes are important summer foods. Smith (1952), in Utah, has shown that certain legumes (clovers) make up 40 percent of the food eaten by mule deer during July. In this same study, lupine made up 57 percent of the food eaten in browse cover type, although it constituted no more than 6 percent of the available food. Introduced forbs such as rangeland alfalfa, small burnet, sainfoin, Utah sweetvetch, arrowleaf balsamroot and chickpea milkvetch are useful in supplying summer foods in the absence of native forbs.

2. Mixtures extend the period of succulence. Even with ample shrubs available, certain grasses (smooth brome, Russian wildrye, bluebunch wheatgrass) and forbs are needed to provide succulent forage into the critical periods of late winter and early spring. Lack of such plants may cause game to seek farmlands where succulent forage is available. Providing herbaceous species that grow early in the spring can help to prevent game depredation on croplands.

3. Certain grass species (smooth brome, intermediate wheatgrass, and orchardgrass) are sufficiently shade-tolerant and competitive with dwarf oak and other thicket-growing brush and can reduce their growth to a height where game can reach the foliage (Plummer, Christensen and Monsen 1968).

4. Certain low growing shrubs (big sagebrush, bitterbrush and rabbitbrush) provide escape cover and nesting, brooding and loafing cover for a variety of birds. For example, a minimum of 15 percent live sagebrush crown cover is required for good sage grouse habitat

(Western States Sage Grouse Committee 1968). Desirable habitat conditions are created for seed eating birds and mammals when shrubs are associated with seed producing grasses and forbs.

5. Mixtures produce more ground cover than single species, especially where shrubs and herbaceous species grow together. Plummer, Christensen and Monsen (1968) record a situation in Utah where, in a 21 year old planting, pure crested wheatgrass was providing 50 percent ground cover; a mixed half and half crested and intermediate wheatgrass stand was providing ground cover of 72 percent; but with the presence of rubber rabbitbrush, the ground cover increased to 95 percent.

6. A variety of plant species helps to reduce infestation of insects such as the Black Grass Bug (Labops hesperius) (Jensen 1971 and Cozakos 1972). The presence of drought resistant species in a mixture also helps to reduce the potential of losing a stand from adverse climatic conditions.

7. Rapidly developing species provide needed forage during the establishment of slower species. Big sagebrush, rubber rabbitbrush, black sagebrush, yellow sweetclover and small burnet develop quickly and supply forage within three years. Slower developing and more persistent plants (antelope bitterbrush, true mountain mahogany, curlleaf mountain mahogany, Stansbury cliffrose, arrowleaf balsamroot, Utah sweetvetch and most perennial forbs) gradually increase sufficiently to add to the value of a mixture.

8. A variety of plant species is better suited to extremely varied terrain and climatic conditions that occur typically on foothill and mountain rangelands (Plummer, Christensen and Monsen 1968). In these areas, site characteristics change radically, often within a few feet. Several species in a mixture take advantage of this diversity and the best adapted species excel, thereby increasing the chance of achieving successful range restoration work.

9. Where a variety of species is represented, the roots penetrate to various depths. Some species utilize surface moisture, others use that from deeper levels, still others may use both shallow and deep moisture. The deeper rooted plants may continue active growth for some time after the surface moisture has been exhausted. The somewhat deeper-rooted perennial grasses continue growing longer until the moisture in their root zone has been depleted. Shrubs, with their still deeper roots, may continue active growth for a much longer period.

10. Certain species may have favorable influences on others; for example, the presence of legumes on low nitrogen sites increases the protein content of the grass component (Gomm 1964). Bleak (1968) has shown that in a grass-alfalfa mixture, if soil moisture is not limiting, higher yields result from the legume drawing nutrients from deeper depths and supplying nitrogen by bacterial fixation for grass use.

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COMMON AND BOTANICAL NAMES OF
SPECIES MENTIONED

Alfalfa	Medicago sativa
Antelope bitterbrush	Purshia tridentata
Arrowleaf balsamroot	Balsamorhiza sagittata
Big sagebrush	Artemisia tridentata
Black sagebrush	Artemisia nova
Bluebunch wheatgrass	Agropyron spicatum
Chickpea milkvetch	Astragalus falcatus
Crested wheatgrass	Agropyron cristatum
Curlleaf mountain mahogany	Cercocarpus ledifolius
Dwarf oak	Quercus sp.
Fourwing saltbush	Atriplex canescens
Intermediate wheatgrass	Agropyron intermedium
Juniper	Juniperus osteosperma
Lupine	Lupinus sp.
Rubber rabbitbrush	Chrysothamnus nauseosus
Orchard grass	Dactylis glomerata
Pinyon	Pinus monophylla
Russian wildrye	Elymus junceus
Sainfoin	Onobrychis vidiaefolia (sativa)
Small burnet	Sanguisorba minor
Smooth brome	Bromus inermis
Stansbury cliffrose	Cowania mexicana stansburiana
True mountain mahogany	Cercocarpus montanus montanus
Utah sweetvetch	Hedysarum boreale utahensis
Yellow sweetclover	Melilotus officinalis